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(12) UK Patent Application (19) GB (11) 2 161 752 A

(43) Application published 22 Jan 1986

(21) Application No 8517070

(22) Date of filing 5 Jul 1985

(30) Priority data

(31) 3425086

(32) 7 Jul 1984

(33) DE

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B41M 5/00 B41F 17/00 B41J 3/44

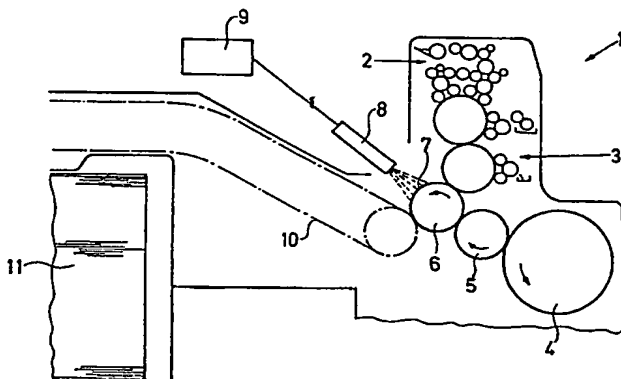
(52) Domestic classification
B6C 104 105 10X 253 304 30X 753 754 BBB
B6F LX

(56) Documents cited
None

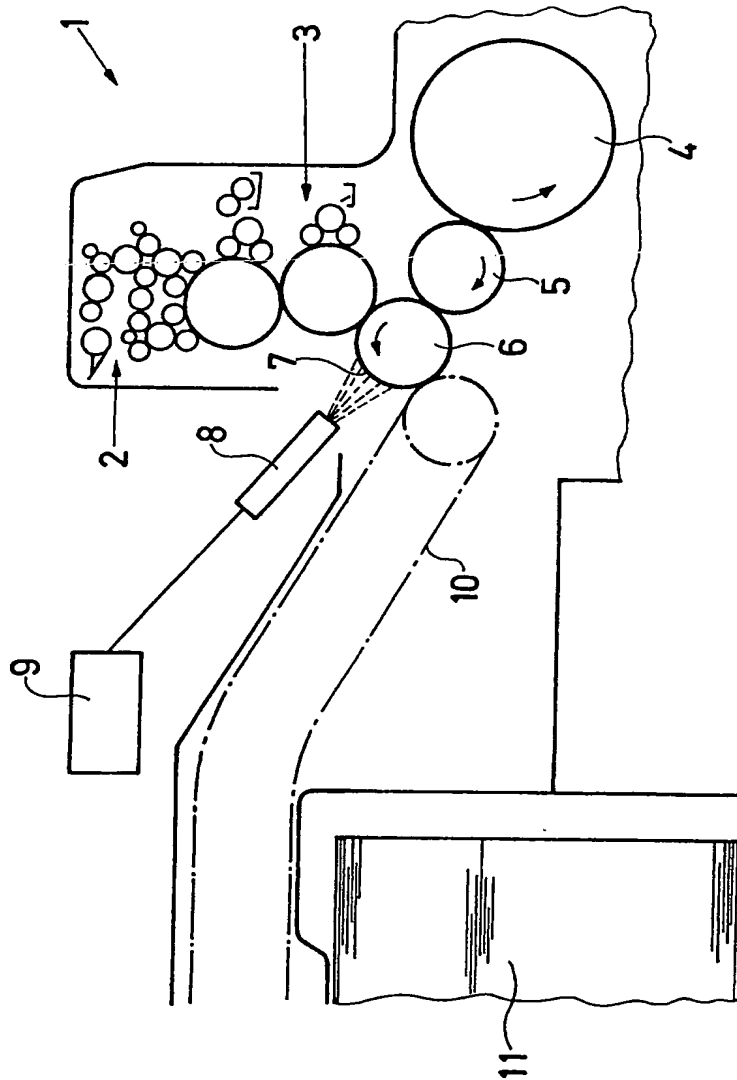
(58) Field of search
B6C
B6F

(54) Process for producing
individualised copies of a printed sheet
or web

(57) A paper sheet or a web is printed in accordance with (e.g.) the offset printing process at 1. Subsequently a part of the print is removed at predetermined points under the influence of applied energy at 7. The intensity of the energy and its direction are controllable. The energy can be modulated laser light, visible, IR or UV light, ultrasonic energy or a combination.



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SPECIFICATION

Process for producing individualised copies of a printed sheet or web

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This invention relates to a process for producing individualised copies of a printed sheet or web.

A great number of printed sheets with identical information content are produced with the aid of printing machines. On the other hand, by using numbering units, for example, one or more characters, changing from sheet to sheet, can be additionally printed on each sheet. In this way, unique individualised copies are produced which differ only slightly from each other. Space requirements, the mechanical complexity of the numbering units, and the low printing rates, however, restrict their use.

From DE-AS 2725093, a printing process is known in which, under the influence of a certain form of energy, an image-related latent change is produced in the printing medium, which is made visible by means of a development process. The print medium is coated, and subjected to quickly and easily varied differential energy radiation so that printing ink or dampening agent is absorbed selectively. This process therefore renders a printing plate unnecessary; the printed medium selectively absorbs dampening agent or ink. The resulting unique copies can therefore completely differ from each other although printed in accordance with the offset printing process. This special process requires an expensive printing medium, since this must be coated, involving considerable expenditure, over its entire surface prior to printing.

In DE-OS 3038044, a process is described in which an electrically insulating fluid is applied to the paper to be printed. Subsequently, an electrically conductive fluid is applied to the previously coated paper and then removed once again with the aid of a screened image-related electrical field. The paper is subsequently printed by the offset printing process. This coating procedure prior to printing proves extremely expensive and labour-intensive.

In DE-PS 2501793, a printing machine is described in which surface coating does not take place, but rather the printing ink is applied to normal paper. The required effect of obtaining legible matter varying considerably from copy to copy is achieved by means of an ink jet process. It should be mentioned that particular disadvantages of this process are that not all print media can be printed with this thin-bodied ink, and that the ink tends to dry at the mouth of its nozzle in image-free sections, resulting in malfunctions during operation.

The altering of the legible matter by means of laser light is described in connection with a process for producing coloured paper pictures in DE-OS 2043140. This process makes use of image-related controlled laser light in order to produce an offset print form which can always be varied, the "intermediate copy carrier", in a printing machine. However, as soon as the legible matter on the print

medium is to be changed, it is necessary to replace the print form. This replacement of the "intermediate copy carrier" makes this process extremely expensive.

70 It is an object of the present invention to make it possible to reduce the expenditure and effort required for a process for producing individualised copies using a printing machine. More particular objects are to render unnecessary expensive pre-coating in a separate system, and to provide a means of changing sections of printed sheets or webs in such a way that additionally required information is legible.

According to the present invention, we provide a process for producing individualised copies of a printed sheet or web in the course of a single printing, wherein: the sheet or web is subjected to plenary printing at predetermined points; the resulting printed sheet or web is subsequently subjected selectively to the effects of a form of energy having the property of being able to take away this printing; and, under the influence of this energy, the printing on the printed sheet or web is taken away at predetermined points, thereby producing individualised copies. (It is to be understood that the printing mentioned herein is described as "plenary" simply to reflect the fact that subsequent variations are subtractive).

Under the influence of the above-mentioned energy, the printing (i.e. the ink) is removed once again at the predetermined points so that either the original paper (commonly white paper) or an underlying coloured layer reappears. In this way, varied pieces of legible matter can be provided in high quality printed products at an extremely fast rate.

More particularly, the characteristics of a typeface, e.g. the type height, the type width or the style of the letters, can be quickly changed. The effect of the energy specified can be controlled by means of appropriate auxiliary equipment (typically some such "periphery" device as a computer). This arrangement can replace prior-art addressing machines or complex numbering units. The stored data to be reproduced can be directly transferred on to the printed sheet or web.

Preferably the application of the above-mentioned energy is adjustable.

Preferably the said energy comprises modulated laser light, visible light, infrared light, ultraviolet light, or ultrasonic energy, or a combination of any two or more thereof.

The invention also includes an apparatus suitable for use in producing individualised copies of a printed sheet or web by a process in accordance with the invention, comprising a printing unit and a differential energy application device, this device being disposed downstream of the printing unit, designed for the application of energy to predetermined points on a printed sheet or web, and being provided with a memory in which data for differential energy application are stored.

One embodiment of the invention is described below in more detail with reference to the accompanying diagrammatic drawing, in which the single

Figure is a side view of the last printing unit of a printing machine, provided with an arrangement for differential energy application in accordance with the invention.

- 5 The printing machine of which a portion is shown in Fig. 1 has a final offset printing unit 1, employing a prior-art inking device 2 and dampening unit 3.

10 The sheets are fed in good register via the drums 4 and 5 to cylinder 6 of the last offset printing unit 1.

At point 7, downstream of the final printing point, a beam of laser light passes over the sheet. For this purpose, a laser source 8 is modulated by 15 means of an electronic memory 9. The information which is to be inscribed by the laser beam is stored in the memory 9. The laser beam removes the applied layer at the specified points so that the original paper (commonly white paper) or an underlying colour layer reappears.

20 On completion of data transfer to the preprinted sheets, the said sheets are fed to the stack 11 with the aid of the elevator chain 10.

With the aid of the last offset printing unit 1, it is 25 also possible to print the preprinted sheet with an information area which partially or completely covers the sheet. Over this area, one applies an ink particularly appropriate for this purpose, or a similar type of material. The desired additional matter 30 is applied by means of the laser 8 in this uniformly preprinted area, which may be of any size. The size and shape of this area are determined by a respective printing plate.

35 *List of components*

- 1 Offset printing unit
- 2 Inking device
- 3 Dampening unit
- 4 Drum
- 40 5 Drum
- 6 Cylinder
- 7 Point of incidence of laser beam
- 8 Laser source
- 9 Memory
- 45 10 Elevator chain
- 11 Stack

CLAIMS

- 50 1. A process for producing individualised copies of a printed sheet or web in the course of a single printing, wherein:

the sheet or web is subjected to plenary printing at predetermined points; the resulting printed

- 55 sheet or web is subsequently subjected selectively to the effects of a form of energy having the property of being able to take away this printing; and,

60 under the influence of this energy, the printing on the printed sheet or web is taken away at predetermined points, thereby producing individualised copies.

2. A process in accordance with claim 1 wherein the application of the said energy is adjustable.

3. A process in accordance with claim 1 or 2 wherein the said energy comprises modulated laser light, visible light, infrared light, ultraviolet light, or ultrasonic energy, or a combination of any two or more thereof.

4. A process in accordance with claim 1, substantially as described with reference to the accompanying drawing.

5. An apparatus suitable for use in producing 75 individualised copies of a printed sheet or web by a process in accordance with claim 1, comprising a printing unit and a differential energy application device, this device being disposed downstream of the printing unit, being designed for the application of energy to predetermined points on a 80 printed sheet or web, and being provided with a memory in which data for differential energy application are stored.

6. An apparatus in accordance with claim 5, 85 substantially as described with reference to the accompanying drawing.

Printed in the UK for HMSO, D8818935, 12.85, 7102.
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